PATENT CLAIMS

1. Method for determining at least one digital signal value from an electrical signal that contains signal information and redundancy information for the signal information determined from the signal information,

- whereby a dependability degree is approximated from the electrical signal for forming the signal value, whereby the approximation of the dependability degree ensues such that a target function that contains a model of a transmission channel via which the electrical signal was transmitted is optimized; and

- whereby the digital signal value is determined dependent on the respective dependability degree.

2. Method according to claim 1, whereby a plurality of digital signal values are determined from the electrical signal.

3. Method according to claim 1 or 2, whereby the model is a non-linear regression model of the transmission channel.

4. Method according to claim 3, whereby the target function is formed according to the following rule:

$$
f = \sum_{i=1}^{k} \left(\beta_i - \frac{4E_b k}{N_0 n} y_i \right)^2 + \sum_{i=k+1}^{n} \left(\ln \left[\frac{1 + \prod\limits_{j \in J_i} \dfrac{\exp(\beta_j) - 1}{\exp(\beta_j) + 1}}{1 - \prod\limits_{j \in J_i} \dfrac{\exp(\beta_j) - 1}{\exp(\beta_j) + 1}} \right] - \frac{4E_b k}{N_0 n} y_i \right)^2 .
$$

with

$\beta_i = L(U_i|y_i)$, and with

$$L\left(U_i \middle| \underline{y}\right) = \ln\left(\frac{\sum\limits_{\substack{\underline{v} \in C \\ v_i = +1}} \exp\left(-\frac{\left(\underline{y} - \underline{v}\right)^T\left(\underline{y} - \underline{v}\right)}{\frac{N_0 n}{E_b k}}\right)}{\sum\limits_{\substack{\underline{v} \in C \\ v_i = -1}} \exp\left(-\frac{\left(\underline{y} - \underline{v}\right)^T\left(\underline{y} - \underline{v}\right)}{\frac{N_0 n}{E_b k}}\right)}\right)$$

whereby

- N_0 indicates a single-sided noise power density,

- n indicates a plurality of digital signal values contained in the signal,

- E_b denotes an average signal energy for one of the k signal values, i.e. of the information bits,

- k denotes a plurality of digital signal values contained in the electrical signal,

- $\underline{y}$ denotes a vector from gothic $\mathfrak{R}^n$ that describes the signal,

- C denotes the set of all channel code words,

- $\underline{C}$ denotes an n-dimensional random quantity for describing the signal value,

- $\underline{v}$ denotes a vector from C,

- i denotes an index for unambiguous identification of the signal value v_i,

- U_i denotes a random variable of the signal value v_i,

- $L(U_i|\underline{y})$ denotes the dependability degree,

- J_i denotes a set of digital values of the redundancy information, and

- j denotes a further index,

the factor in the numerator.

5.   Method according to one of the claims 1 through 4, whereby the target function is subjected to a global minimization.

6.   Method according to one of the claims 1 through 5,

- whereby the dependability degree comprises an operational sign information and an amount information; and

- whereby the determination of the signal value ensues only dependent on the operational sign information.

7.   Method according to one of the claims 1 through 6, whereby the electrical signal is a systematic block code.

8.   Method according to one of the claims 1 through 7, whereby the electrical signal is a radio signal.

9.   Method according to one of the claims 1 through 8, whereby the electrical signal is a restored signal of archived digital data.

10.   Arrangement for determining at least one digital signal value from an electrical signal that contains signal information and redundancy information for the signal information determined from the signal information;

comprising a computer unit that is configured such that

- a dependability degree is approximated from the electrical signal for forming the signal value, whereby the approximation of the dependability degree ensues such that a target function that contains a model of a transmission channel via which the electrical signal was transmitted is optimized; and

- the digital signal value is determined dependent on the respective dependability degree.

11.   Arrangement according to claim 10, comprising a receiver unit for receiving the electrical signal and for supplying the electrical signal to the computer unit.

12. Arrangement according to claim 11, comprising a demodulator unit for the demodulation of the electrical signal that is connected via an input to the receiver unit and via an output to the computer unit.

13. Arrangement according to claim 11 or 12, whereby the receiver unit comprises an antenna.

14. Arrangement according to one of the claims 10-13, whereby the computer unit is configured such that a plurality of digital signal values are determined from the electrical signal.

15. Arrangement according to one of the claims 10 through 14, whereby the computer unit is configured such that the model is a non-linear regression model of the transmission channel.

16. Arrangement according to claim 15, whereby the computer unit is configured such
- that the target function is formed according to the following rule:

$$
f = \sum_{i=1}^{k} \left(\beta_i - \frac{4E_b k}{N_0 n} y_i \right)^2 + \sum_{i=k+1}^{n} \left(\ln \left(\frac{1 + \prod\limits_{j \in J_i} \frac{\exp(\beta_j) - 1}{\exp(\beta_j) + 1}}{1 - \prod\limits_{j \in J_i} \frac{\exp(\beta_j) - 1}{\exp(\beta_j) + 1}} \right) - \frac{4E_b k}{N_0 n} y_i \right)^2 .
$$

with

$\beta_i = L(U_i|y_i)$, and with

$$L\left(U_i|\underline{y}\right) = \ln\left(\frac{\displaystyle\sum_{\substack{\underline{v}\in C \\ v_i=+1}} \exp\left(-\frac{\left(\underline{y}-\underline{v}\right)^T\left(\underline{y}-\underline{v}\right)}{\dfrac{N_0 n}{E_b k}}\right)}{\displaystyle\sum_{\substack{\underline{v}\in C \\ v_i=-1}} \exp\left(-\frac{\left(\underline{y}-\underline{v}\right)^T\left(\underline{y}-\underline{v}\right)}{\dfrac{N_0 n}{E_b k}}\right)}\right)$$

whereby

- N_0 indicates a single-sided noise power density,
- n indicates a plurality of digital signal values contained in the signal,
- E_b denotes an average signal energy for one of the k signal values, i.e. of the information bits,
- k denotes a plurality of digital signal values contained in the electrical signal,
- $\underline{y}$ denotes a vector from gothic $\mathfrak{R}^n$ that describes the signal,
- C denotes the set of all channel code words,
- $\underline{C}$ denotes an n-dimensional random quantity for describing the signal value,
- $\underline{v}$ denotes a vector from C,
- i denotes an index for unambiguous identification of the signal value v_i,
- U_i denotes a random variable of the signal value v_i,
- $L(U_i|\underline{y})$ denotes the dependability degree,
- J_i denotes a set of digital values of the redundancy information, and
- j denotes a further index,

the factor in the numerator.

17.　　Arrangement according to one of the claims 10 through 16, whereby the computer unit is configured such that the target function is subjected to a global minimization.

18.　　Arrangement according to one of the claims 10 through 17 that is allocated to a radio transmission system.

19.　　Arrangement according to one of the claims 10 through 17 that is allocated to a system for the reconstruction of archived digital data.